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Community Empowerment through Local Food Diversification and Appropriate Technology in Sapit Village East Lombok

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Abstract: This community service program aims to strengthen the capacity of community groups in Sapit Village, East Lombok, Indonesia, to transform locally available agricultural commodities into value-added food and beverage products. The program was implemented through participatory socialization, food safety education, hands-on training, and technology transfer. The activities covered good manufacturing practices, standardized production procedures, and the processing of sweet potatoes into chips and flour, coffee leaves into tea, and ginger into simplicia, as well as the development of sweet potato flour-based noodles and traditional snacks. The program involved two community partners: the Dongo Baru Community Forest Farmer Group and the Sapit Village Family Welfare Group. Program evaluation was conducted using a 13-item dichotomous questionnaire administered before and after four training sessions. A total of 60, 41, 51, and 25 questionnaire responses were collected across the four sessions, respectively. The data were analyzed descriptively by calculating the proportions of affirmative responses and the corresponding percentage-point changes between pre-test and post-test assessments. The proportion of affirmative responses increased from 6.54% to 95.00% in the introductory session, from 49.16% to 95.68% in sweet potato processing, from 23.20% to 96.90% in coffee leaf and ginger processing, and from 27.08% to 96.00% in sweet potato flour-based product development. One inconsistent questionnaire item was excluded from the aggregate analysis of the coffee leaf and ginger processing session. These findings indicate substantial improvements in participants' immediate self-reported knowledge and familiarity with local food processing techniques. Overall, the program highlights the potential of participatory technology transfer to promote community-based food diversification and value addition. However, sustained mentoring is needed to consolidate practical competencies and support the development of sustainable community-based production.

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Introduction

Sapit Village, located in East Lombok Regency, West Nusa Tenggara, Indonesia, possesses agricultural and plantation resources that offer opportunities for developing community-based food enterprises. Sweet potatoes, coffee leaves, and ginger are among the local commodities that can be processed into value-added food and beverage products. However, the availability of these resources has not been fully supported by sufficient processing knowledge, appropriate production technology, standardized procedures, and market-oriented product development. These conditions highlight the importance of community empowerment programs that integrate local resource utilization, practical skills development, and appropriate technology application to support sustainable economic opportunities.

The development of local food products requires more than access to agricultural raw materials. Product quality and production consistency depend on appropriate raw material selection, processing techniques, hygiene and sanitation practices, and standardized operating procedures. Previous community service initiatives have demonstrated the potential of practical training and technological assistance to improve community participation in food processing and product diversification (Abidin et al., 2022; Irsyadi et al., 2026). Nevertheless, continued mentoring remains essential to help community groups apply production knowledge consistently and develop products with greater economic value.

To address these challenges, the Kosabangsa community service program in Sapit Village was implemented through collaboration between Universitas Islam Al-Azhar (UNIZAR) as the implementing university, Universitas Brawijaya (UB) as the assisting university, the Sapit Village Government, the Dongo Baru Community Forest Farmer Group, and the Sapit Village Family Welfare Movement (PKK). The program emphasized the transfer and application of university-developed food processing technologies. UB provided technical assistance related to sweet potato flour processing, including pregelatinization-based processing technology associated with Patent No. IDS000011534, and robusta coffee-leaf tea processing technology associated with Patent Application No. S00202004395. The technological applications were supported by appropriate processing equipment, including drying ovens, slicing and chopping machines, flour milling and sieving equipment, noodle-making equipment, and packaging tools. These technologies were introduced through demonstrations, hands-on training, and participatory mentoring, with the aim of strengthening the capacity of the implementing team and community partners to process local commodities into diversified products.

The program addressed the different production needs of its two principal community partners. The Dongo Baru Community Forest Farmer Group focused on processing coffee leaves and ginger into herbal beverage ingredients, including coffee-leaf tea, ginger simplicia, and coffee-leaf–ginger beverage formulations. Meanwhile, the Sapit Village PKK group focused on processing sweet potatoes into flour and developing derivative products, including sweet potato noodles, jaje tareq, and jaje bawang. Food safety education, Good Manufacturing Practices (GMP), and Standard Operating Procedures (SOPs) were integrated into the training activities to promote hygienic and consistent processing. This approach positioned local communities as active participants in adapting appropriate technologies to their available resources and production needs.

Previous community service studies have demonstrated the benefits of food diversification and technology-based training. Dharmayani et al. (2024) reported technology transfer and mentoring for potato flour and noodle production, while Haris et al. (2026)

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examined training activities involving purple sweet potato processing among PKK members. Santoso et al. (2025) explored the development of herbal tea from robusta coffee leaves, whereas Suwasono et al. (2023) applied a participatory approach to herbal beverage development using cascara and ginger. These studies provide relevant evidence for individual commodity-processing initiatives. However, the practical contribution examined in the present program concerns the integration of multiple commodity-processing activities and two community groups with different production needs within a coordinated university–community partnership. This integrated approach provides an opportunity to examine how research-derived technologies can be introduced through collaborative training and adapted to different local production contexts.

The program adopted a participatory empowerment orientation that emphasized collaboration, practical learning, and technology adaptation. Community-based co-creation recognizes local participants as partners in identifying needs and developing applicable solutions rather than merely receiving technical assistance. Studies by Lang et al. (2024), Habiyaremye (2023), and Utami et al. (2022) highlight the relevance of collaborative learning, reciprocal knowledge exchange, and local participation in community development. In food processing, research on sweet potato flour, coffee-leaf utilization, and ginger processing also demonstrates the importance of controlling processing conditions to maintain product characteristics. Similarly, food safety training studies emphasize that improvements in knowledge should be distinguished from demonstrated behavioral changes and sustained production practices (Insfran-Rivarola et al., 2020; Young et al., 2019, 2020). Therefore, combining participatory training with structured evaluation is important for identifying immediate learning outcomes and determining areas requiring further technical assistance.

Accordingly, this community service program aimed to strengthen the capacity of community groups in Sapit Village through appropriate technology transfer, local food diversification, and participatory training. Specifically, the program sought to introduce processing technologies for sweet potatoes, coffee leaves, and ginger; improve participants' understanding of food safety and production procedures; evaluate changes in self-reported knowledge and familiarity through pre-test and post-test assessments; and identify priorities for subsequent mentoring and sustainable product development. The program's contribution lies in integrating university-derived technologies, differentiated community partnerships, and structured training evaluation within a local food empowerment initiative.

Method

The community service program was conducted in Sapit Village, Suela District, East Lombok Regency, West Nusa Tenggara, Indonesia, from October 10 to 25, 2026. The program involved Universitas Islam Al-Azhar (UNIZAR) as the implementing university, Universitas Brawijaya (UB) as the assisting university, the Sapit Village Government, the Dongo Baru Community Forest Farmer Group, and the Sapit Village Family Welfare Movement (PKK).

The program employed a *Participatory Community Empowerment* approach integrating *co-creation*, *technology transfer*, *participatory mentoring*, and *learning by doing*. This framework emphasized collaboration between universities and community partners in identifying local resources, addressing production constraints, adapting appropriate technologies, and strengthening processing knowledge. The implementation comprised five interconnected stages: (1) community outreach and needs identification, (2) technical

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training, (3) appropriate technology demonstration and application, (4) participatory mentoring and evaluation, and (5) planning for program sustainability.

The Dongo Baru Community Forest Farmer Group focused on utilizing coffee leaves and ginger for beverage-related products, while the Sapit Village PKK focused on sweet potato processing and flour-based food diversification. These different priorities guided the selection of training materials and technological applications.

Appropriate Technology Transfer

Technology transfer was facilitated through collaboration between UB and UNIZAR by introducing research-derived processing knowledge, technical demonstrations, and guided practical activities. The program referred to sweet potato flour processing technology associated with Patent No. IDS000011534 and robusta coffee-leaf tea processing technology associated with Patent Application No. S00202004395.

The appropriate technologies were selected according to the processing requirements of each community partner. For sweet potato processing, the production stages included raw material selection, washing, peeling, slicing, pretreatment, drying, milling, and sieving. Additional equipment supported dough preparation and noodle production. For coffee-leaf tea and ginger processing, the activities emphasized raw material selection, chopping, slicing, controlled drying, and hygienic handling.

Table 1. Appropriate Technologies and Their Functions in the Kosabangsa Program

Community Partner	Appropriate Technology	Main Function
Sapit Village PKK	Sweet potato peeling equipment	Facilitating raw material preparation before processing
Sapit Village PKK	Slicing machine	Producing more uniform sweet potato slices
Sapit Village PKK	Steamer	Supporting thermal pretreatment of sweet potatoes
Sapit Village PKK	Drying oven	Facilitating moisture reduction during flour preparation
Sapit Village PKK	Flour milling machine and sieve	Converting dried sweet potatoes into flour and separating particle sizes
Sapit Village PKK	Dough mixer and noodle-making machine	Supporting the preparation of flour-based noodles
Dongo Baru Farmer Group	Drying oven	Facilitating drying of coffee leaves and ginger
Dongo Baru Farmer Group	Coffee-leaf chopping machine	Reducing leaf size for subsequent processing
Dongo Baru Farmer Group	Spice slicing machine	Producing more uniform ginger slices
Dongo Baru Farmer Group	Vacuum sealer	Supporting the preparation of sealed product packaging

Note: The equipment types and functions are based on the program's technology implementation plan. Equipment operating capacity, power requirements, temperature ranges, and permanent handover status require confirmation from technical records.

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Technology transfer activities were delivered through demonstrations and guided practice, accompanied by explanations of equipment functions, production procedures, hygiene requirements, and product handling. The program distinguished the introduction and use of processing equipment during training from permanent equipment transfer and independent technology adoption by community partners.

Implementation Procedures

The program activities were implemented through participatory outreach, technical training, hands-on demonstrations, and initial evaluation. The introductory activity was conducted on October 10, 2026, covering the Kosabangsa program, functional food concepts, food safety, Good Manufacturing Practices (GMP), and Standard Operating Procedures (SOPs). On October 11, 2026, training activities focused on sweet potato chips and flour production, as well as coffee-leaf tea and ginger simplicia processing. On October 24, 2026, an additional training activity addressed ginger simplicia preparation and the formulation of coffee-leaf–ginger beverages. On October 25, 2026, training focused on sweet potato flour diversification into noodles and traditional snacks, including jaje tareq and jaje bawang.

The training methods combined technical explanations, demonstrations, guided processing, discussions, and direct practice. Participants were introduced to raw material preparation, production procedures, and hygiene principles relevant to each commodity. Packaging development, digital marketing, business registration, halal certification, and group management were identified as subsequent program stages and were not included as completed outcomes in the present evaluation.

Program evaluation employed pre-test and post-test questionnaires administered during four documented training sessions. The available datasets comprised 60 response sets for outreach and food safety education, 41 for sweet potato chips and flour processing, 51 for coffee-leaf tea and ginger simplicia processing, and 25 for sweet potato flour derivative-product training. Each questionnaire contained 13 dichotomous Yes/No items assessing self-reported knowledge, familiarity with processing procedures, previous product experience, and interest in practical activities. These responses were treated as distinct evaluation dimensions rather than direct measurements of practical competence. The four datasets represented 177 session-level response sets, not necessarily 177 unique participants, because individuals may have attended multiple sessions. Photographs, training records, and activity documentation were also examined as supporting evidence of implementation. The October 24 activity was documented qualitatively because a separate quantitative evaluation dataset was unavailable.

The evaluation data were analyzed using descriptive quantitative analysis. The proportion of affirmative responses for each questionnaire item was calculated by dividing the number of Yes responses by the total number of valid responses and multiplying by 100. Changes between pre-test and post-test assessments were expressed in percentage points.Session-level aggregate proportions were calculated using the total affirmative responses across valid questionnaire items divided by the total valid item responses. The findings were presented in descriptive tables and comparative bar charts.Data consistency was examined by comparing the sum of Yes and No responses with the reported response count for each training session. One inconsistency was identified in the seventh post-test item of the coffee-leaf tea and ginger simplicia dataset, where 53 responses were recorded despite a session count of 51. This item was excluded from both pre-test and post-test aggregate calculations, leaving 12 valid items for that session.

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No paired inferential statistical tests were performed because identifiable individual-level pre-test and post-test records were unavailable. Consequently, the analysis focused on descriptive changes in self-reported responses and did not establish causal effects, independently verified practical competence, or long-term technology adoption.

Result and Discussion

Implementation of Community Empowerment and Appropriate Technology Transfer

The Kosabangsa community service program in Sapit Village was implemented through collaboration between Universitas Islam Al-Azhar (UNIZAR), Universitas Brawijaya (UB), the village government, the Dongo Baru Community Forest Farmer Group, and the Sapit Village Family Welfare Movement (PKK). The program integrated community education, appropriate technology transfer, and practical training to support the diversification of locally available agricultural commodities.

The activities were conducted through five training sessions between October 10 and 25, 2026. The introductory session focused on functional food awareness, food safety, Good Manufacturing Practices (GMP), and Standard Operating Procedures (SOPs). Subsequent activities introduced the processing of sweet potatoes into chips and flour, the production of coffee-leaf tea and ginger simplicia, the formulation of coffee-leaf–ginger beverages, and the development of sweet potato flour-based noodles and traditional snacks.

The program applied differentiated training activities according to the production priorities of each partner group. The Dongo Baru Community Forest Farmer Group focused on coffee leaves and ginger processing, whereas the Sapit Village PKK concentrated on sweet potato processing and product diversification. This arrangement enabled the program to address different production needs within a coordinated university–community partnership.

Appropriate technology transfer was implemented through technical explanations, equipment demonstrations, and guided processing activities. Sweet potato processing introduced sorting, washing, peeling, slicing, pretreatment, drying, milling, and sieving procedures. Supporting equipment included slicing machines, drying ovens, milling equipment, and sieves. Meanwhile, coffee-leaf tea and ginger processing activities involved material preparation, chopping, slicing, and drying techniques. These activities introduced participants to processing procedures that could support greater consistency and efficiency in local food production.

The technology transfer process was supported by university-developed processing knowledge and participatory mentoring. However, the available documentation primarily demonstrates the introduction and practical use of processing technologies during training. Permanent equipment ownership, independent production capacity, and sustained technology adoption require further verification.

Changes in Participants' Responses Before and After Training

The effectiveness of the training activities was evaluated through pre-test and post-test questionnaires administered during four documented sessions. The questionnaires consisted of 13 dichotomous items assessing self-reported knowledge, familiarity, previous experience, and interest related to local food processing.

The evaluation involved 60 response sets from the introductory session, 41 from sweet potato chips and flour processing, 51 from coffee-leaf tea and ginger simplicia processing, and 25 from sweet potato flour derivative-product training. These represent session-level responses rather than 177 unique participants because some individuals may have attended more than one activity.

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Table 2. Changes in Affirmative Responses Before and After Training

Training Activity	Response Sets	Pre-test (%)	Post-test (%)	Change (pp)
Kosabangsa outreach and food safety education	60	6.54	95	88.46
Sweet potato chips and flour processing	41	49.16	95.68	46.53
Coffee-leaf tea and ginger simplicia processing	51	23.2	96.9	73.69
Sweet potato flour derivative-product training	25	27.08	96	68.92

Note: pp = percentage points. The coffee-leaf tea and ginger session was calculated using 12 valid questionnaire items after excluding one inconsistent item from both assessments.

As shown in Table 2, all four evaluated sessions demonstrated increases in aggregate affirmative responses following the training activities. The largest change occurred during the introductory session, where affirmative responses increased from 6.54% to 95.00%, representing an increase of 88.46 percentage points. This result indicates that the activity substantially increased participants' immediate familiarity with the Kosabangsa program, functional food concepts, and food safety terminology.

The sweet potato chips and flour processing session showed an increase from 49.16% to 95.68%, while the coffee-leaf tea and ginger simplicia session increased from 23.20% to 96.90%. Similarly, the sweet potato flour derivative-product session increased from 27.08% to 96.00%. These findings indicate positive changes in self-reported familiarity and understanding across the evaluated activities. Nevertheless, the results should not be interpreted as direct evidence of objectively verified technical competence.

Outcomes of Kosabangsa Outreach and Food Safety Education

The introductory activity provided participants with basic information about the Kosabangsa program, local food diversification, functional food concepts, food safety, GMP, and SOP implementation. Before the training, participants demonstrated limited familiarity with several concepts, particularly the objectives and activities of the program. Following the activity, affirmative responses increased across all questionnaire items. Awareness of the Kosabangsa program and its objectives increased from 3.33% to 96.67%, while familiarity with functional food concepts increased from 3.33% to 100%.

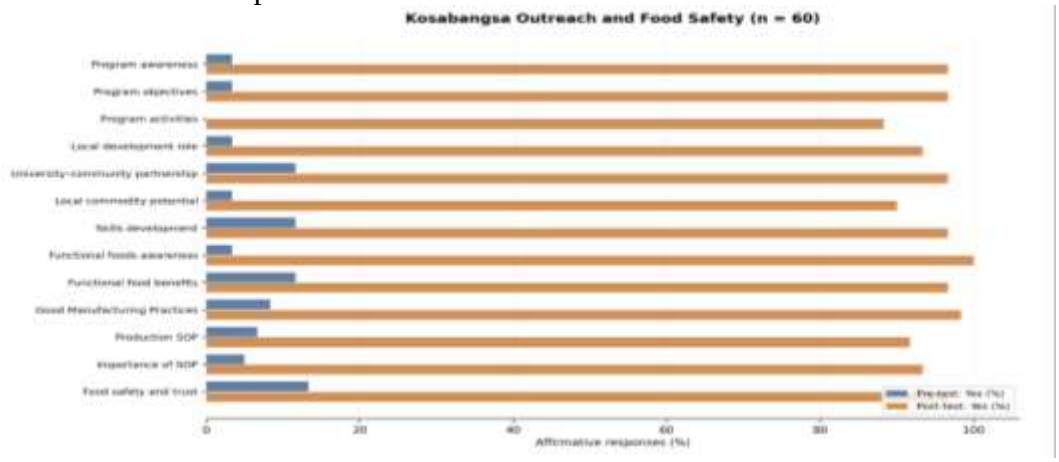


Figure 1. Item-level affirmative responses before and after Kosabangsa outreach and food safety education (n = 60).

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These changes suggest that structured community education was effective in introducing unfamiliar concepts within a short training period. However, the findings primarily reflect immediate self-reported awareness rather than sustained knowledge retention or changes in production behavior.

Outcomes of Sweet Potato Chips and Flour Processing Training

The sweet potato processing training introduced participants to raw material selection, slicing, pretreatment, drying, milling, and flour preparation. Participants were also introduced to hygiene and sanitation principles relevant to small-scale food processing.

Evaluation results demonstrated substantial changes in several processing-related indicators. Awareness of basic sweet potato flour production stages increased from 0% to 100%, while understanding of the influence of slice thickness on chips quality increased from 17.07% to 95.12%. Similarly, awareness of the importance of clean processing equipment increased from 0% to 100%.

These findings indicate that practical demonstrations and structured explanations were associated with improved immediate understanding of processing procedures. Comparable community service initiatives have emphasized the relevance of technology transfer and practical assistance in supporting local food processing activities (Dharmayani et al., 2024; Abidin et al., 2022). However, not all indicators improved. The proportion of affirmative responses concerning clean and closed product packaging decreased from 100% to 87.80%. This reduction of 12.20 percentage points should be examined through subsequent evaluation because the available aggregate data cannot determine whether it resulted from differences in interpretation, questionnaire administration, or actual understanding. The findings highlight the need for continued practical mentoring, particularly in hygienic packaging, production consistency, and the implementation of standardized operating procedures.

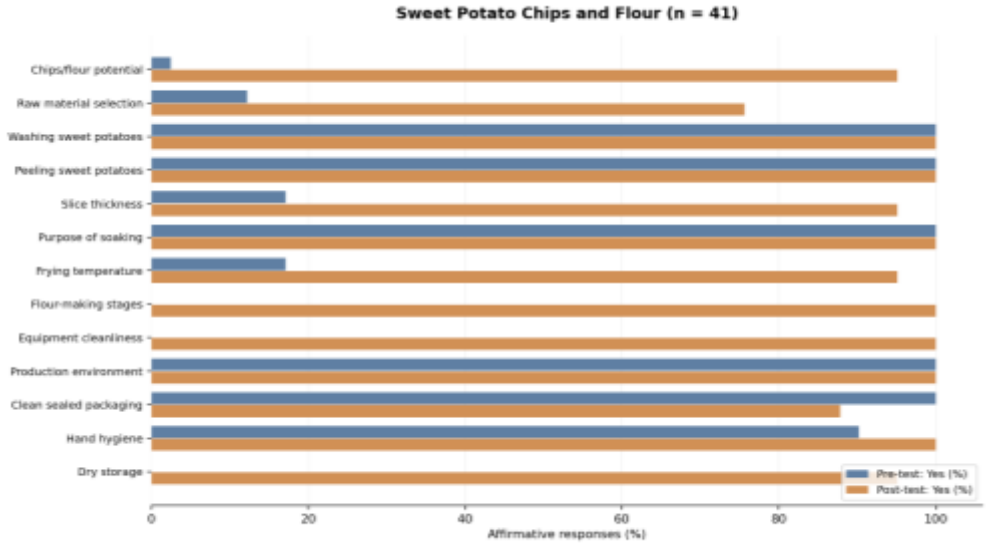


Figure 2. Item-level affirmative responses before and after sweet potato chips and flour processing training (n = 41).

Outcomes of Coffee-Leaf Tea and Ginger Simplicia Processing Training

The coffee-leaf tea and ginger simplicia training introduced participants to the utilization of locally available plantation commodities as ingredients for processed beverage products. Activities included raw material selection, cleaning, slicing, drying, and basic

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preparation techniques. The evaluation demonstrated considerable improvements in participants' reported familiarity with processing procedures. Awareness of basic natural-ingredient processing increased from 0% to 100%. Recognition of ginger simplicia and awareness of the importance of drying each increased from 5.88% to 100%.

These changes indicate that the training provided participants with exposure to processing concepts that were initially unfamiliar. Previous studies have highlighted the potential utilization of coffee leaves and the importance of controlled processing conditions in maintaining their product characteristics (Patil et al., 2022; Huang et al., 2023). Research on ginger processing has also emphasized the importance of drying conditions for product characteristics (Bai et al., 2023).

Nevertheless, several questionnaire items measured prior experience and interest rather than technical knowledge. For example, the proportion of participants reporting that they had tried coffee-leaf tea increased from 9.80% to 80.39%, while interest in practical activities was already 100% before the training. These results should therefore be interpreted according to the specific dimensions measured. One data inconsistency was also identified in the seventh post-test questionnaire item, where the recorded number of responses exceeded the reported session size. This item was excluded from both aggregate calculations, and verification of the original questionnaires remains necessary.

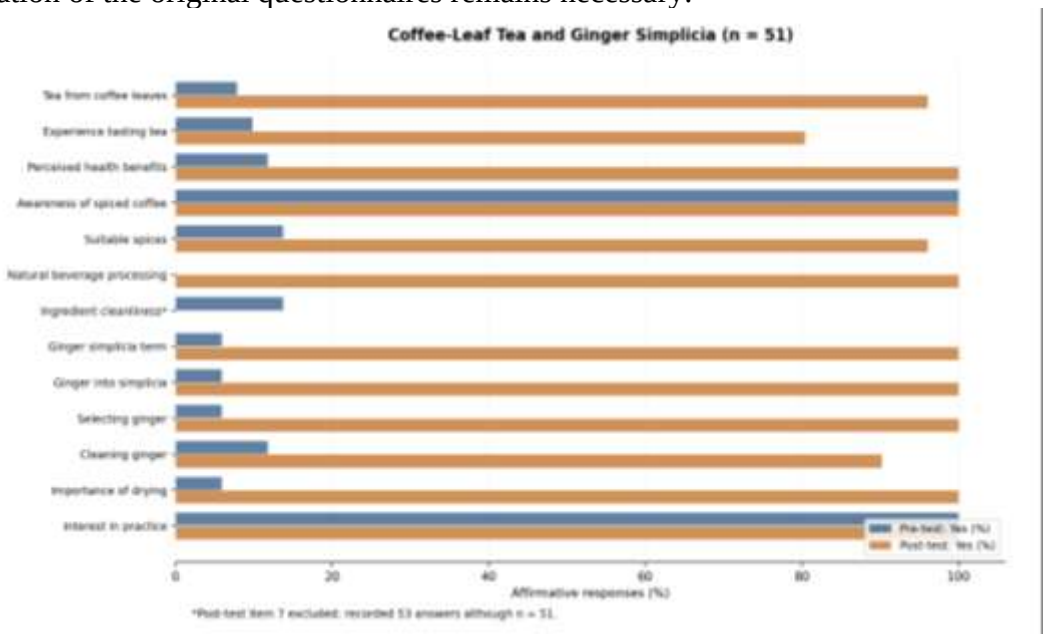


Figure 3. Item-level affirmative responses before and after coffee-leaf tea and ginger simplicia processing training (n = 51).

Outcomes of Sweet Potato Flour Derivative-Product Training

The final documented production training focused on the diversification of sweet potato flour into noodles and traditional snacks, including jaje tareq and jaje bawang. The activity introduced participants to ingredient preparation, formulation, processing procedures, and basic hygiene practices.

The evaluation showed notable increases in familiarity with product preparation. Awareness of appropriate flour storage increased from 0% to 100%, while familiarity with sweet potato noodle production, jaje bawang preparation, and ingredient composition increased from 12% to 100%. These results indicate that the training introduced product-processing knowledge and demonstrated opportunities for utilizing sweet potato flour beyond

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conventional applications. Product diversification may provide an initial foundation for developing value-added local food products and expanding small-scale food processing activities. However, awareness of equipment and ingredient cleanliness increased from 24% to only 80%, indicating that hygiene-related understanding requires additional attention. Meanwhile, knowledge of drying and awareness of business opportunities were already reported by all participants before the activity, leaving no measurable increase in those indicators.

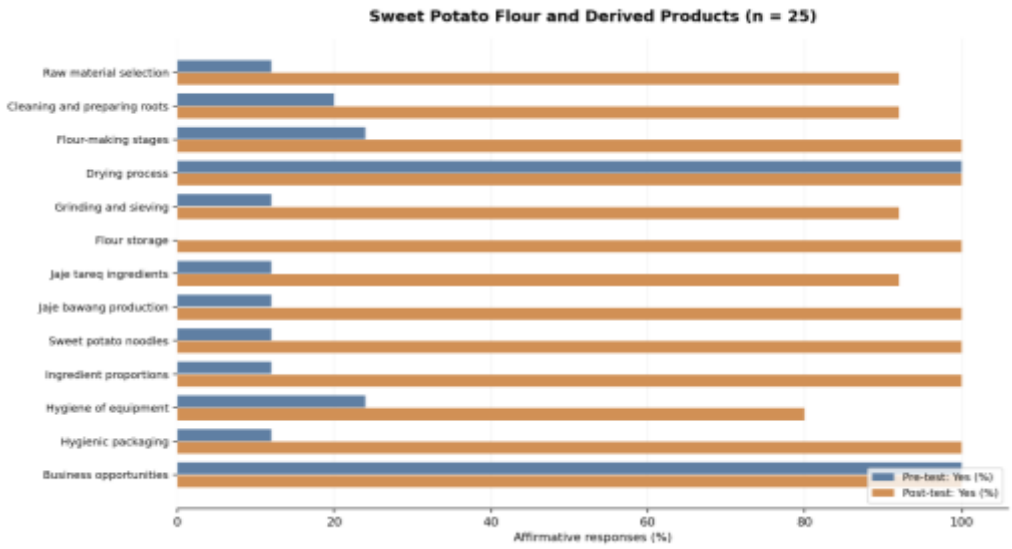


Figure 4. Item-level affirmative responses before and after sweet potato flour derivative-product training (n = 25).

Photographic documentation was used to support the description of training implementation, participant involvement, processing activities, and products introduced during the community service program. To provide concise and representative visual evidence, the documentation is presented in two composite figures rather than separate photographs for every activity.



Figure 5. Practical training in sweet potato processing and diversification into flour-based food products.

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Figure 6. Practical training in coffee-leaf tea and ginger simplicia processing.

The principal contribution of the Kosabangsa program was the integration of appropriate technology transfer, local commodity diversification, and participatory empowerment involving two community groups with different production priorities. The program introduced food processing knowledge and technologies through a coordinated collaboration between the implementing and assisting universities and local partners. The evaluation findings demonstrated positive short-term changes in participants' responses across the four documented training sessions. These results are consistent with the relevance of practice-oriented community empowerment and technology assistance in supporting local food processing initiatives (Abidin et al., 2022; Dharmayani et al., 2024).

From a participatory empowerment perspective, the program provided opportunities for community members to engage in practical learning activities related to their available agricultural resources. This approach corresponds with the principles of collaborative knowledge exchange and context-sensitive technology adaptation discussed in community-based development literature (Lang et al., 2024; Habiyaremye, 2023).

Conclusion

The Kosabangsa community service program in Sapit Village successfully implemented an integrated cross-commodity and cross-partner empowerment model. The participatory interventions—spanning food safety education, processing of sweet potato derivatives, and utilization of coffee leaves and ginger—significantly increased participants' self-reported knowledge and procedural familiarity across all sessions. This initiative established an initial framework for community-based technology transfer, transforming local agricultural yield and plantation by-products into value-added food products through the active collaboration of the PKK and KTH Dongo Baru groups. To translate these short-term capacity gains into sustained economic impact and commercial adoption, follow-up activities should focus on product quality standardization (laboratory testing), formal business

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licensing (NIB, P-IRT, Halal certification), protective packaging, and digital marketing support.

Recommendation

To ensure the sustainability of the community service program, the Dongo Baru Community Forest Farmer Group and the Sapit Village Family Welfare Movement (PKK) are encouraged to consistently implement Standard Operating Procedures (SOPs), Good Manufacturing Practices (GMP), and appropriate food processing technologies introduced during the training. Both community groups should strengthen their production skills through regular practice, improve product quality and hygienic packaging, and develop collective production management to support the continuity of local food and beverage processing activities.

The Sapit Village Government and relevant local authorities are recommended to provide institutional and technical support for community-based food enterprises. This support should include facilitating access to appropriate processing equipment, product quality testing, business registration through the Business Identification Number (NIB), applicable food production permits, halal certification, and digital marketing opportunities. Collaboration with relevant government agencies and local business development institutions is also essential to strengthen market access and the long-term viability of community enterprises.

Future community service teams should prioritize continuous technical mentoring, standardized assessments of participants' practical skills, and periodic monitoring of technology adoption and production performance. Subsequent evaluations should use identifiable paired pre-test and post-test data, validated assessment instruments, and direct observations of production activities to provide stronger evidence of program effectiveness. Further assistance should also address the identified weaknesses in food hygiene and packaging practices, verify inconsistencies in the evaluation data, and assess product quality, production costs, and business sustainability.

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